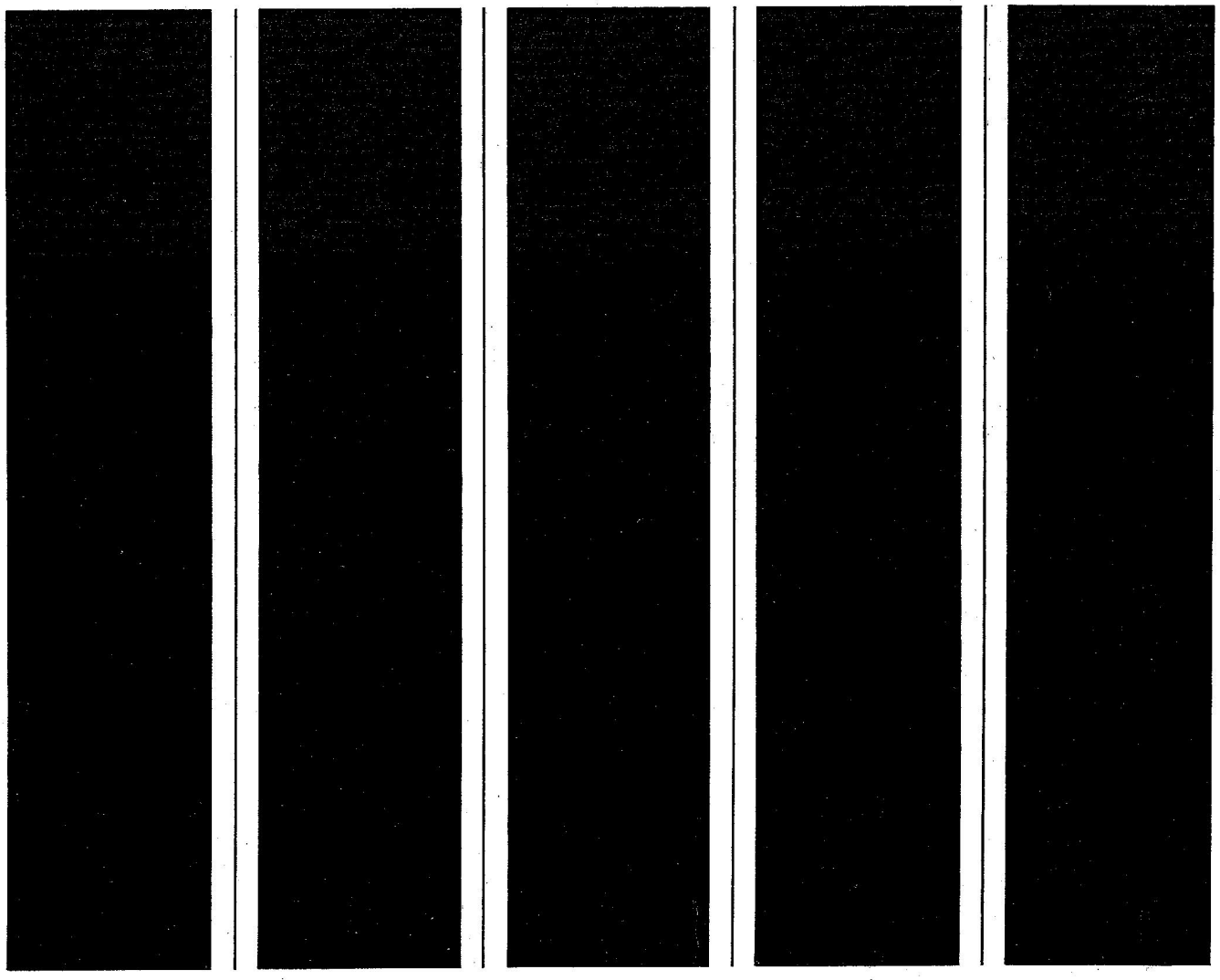
Service Manual
Integrated Stereo Amplifier

420A



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CAUTION NOTICE

The following safety precautions must be followed to assure continued reliability and safety against fire and shock hazard:

1. Replacement parts used during servicing of this appliance must have identical characteristics as those offered and recommended by H. H. Scott, Inc.
2. A dielectric test is to be performed on each appliance following the re-assembly and before returning the unit to the custmer.
3. The dielectric test to be performed on H. H. Scott, Inc. electric components serviced in the United States and Canada for use in these countries shall consist of not less than the following:*
   1) A dielectric tester designed to supply not less than 1100 volts at 60 Hz and employing leakage current indicator(s), is to be used.
   2) The tester is to be connected per the instructions enclosed with the instrument, or as follows:
      a. The tester is connected to the power line receptacle and the power switch is turned on.
      b. Sufficient time is allowed for the tester supply to stabilize and then the output voltage is adjusted for 1080V.
      c. Leads of the tester, usually marked GND and HV, are connected between chassis ground and both blades of the male plug of the power cord.
      d. Switch tester to "test" and observe leakage indicator. **Leakage current must not exceed 0.5 mA.**

* Dielectric tests made by service personnel in countries other than USA and Canada must use test equipment and procedures specified by the safety agency serving that country.

SPECIFICATIONS

Minimum Continuous RMS Output Power per channel, both channels driven into 8 Ohms from 20 Hz – 20 kHz with no more than rated THD
40 watts

Total Harmonic Distortion [78 IHF rated, at 20 Hz – 20 kHz]
0.08%

Intermodulation Distortion [at rated output, 60:7000 Hz; 4:1]
0.08%

Frequency Response [at 1 watt output, ±1 dB]
20 Hz to 20 kHz

Power Bandwidth [at –3 dB]
10 Hz to 30 kHz

Damping Factor [at 1 kHz, for 8 Ohm load]
>60

Input Sensitivity [for rated output]
Phono: 2.5 mV
Aux, Tuner: 150 mV
Tape 1 and 2: 150 mV
Tape 2 DIN Input: 150 mV

Maximum Input Voltage
Phono: 180 mV
Aux, Tuner: 10V
Tape 1 and 2: 10V
Tape 2 DIN Input: 10V

Signal-to-Noise Ratio [shorted input, IHF A network]
Phono; Ref. 10 mV: 80 dB
Aux, Tuner: 85 dB
Tape 1 and 2: 85 dB
Tape 2 DIN Input: 85 dB

Tone Control Range
Bass (100 Hz): ±10 dB
Treble (10 kHz): ±10 dB

Loudness Contour [Volume Control set to –30 dB]
100 Hz: +7 dB
10 kHz: +3.5 dB

Crosstalk
1 kHz: 80 dB

RIAA Deviation [20 Hz to 20 kHz]
±0.5 dB

Channel Separation [78 IHF rated]
Phono (1 kHz): 55 dB
Aux, Tuner, Accessory Input, Tape Play 1 and 2,
Tape 2 DIN Input (1 kHz): 60 dB

Tape Recording Output Level [at rated input sensitivity level]
Tape 1 Rec: 150 mV
Tape 2 Rec: 150 mV
Tape 2 DIN Output: 30 mV

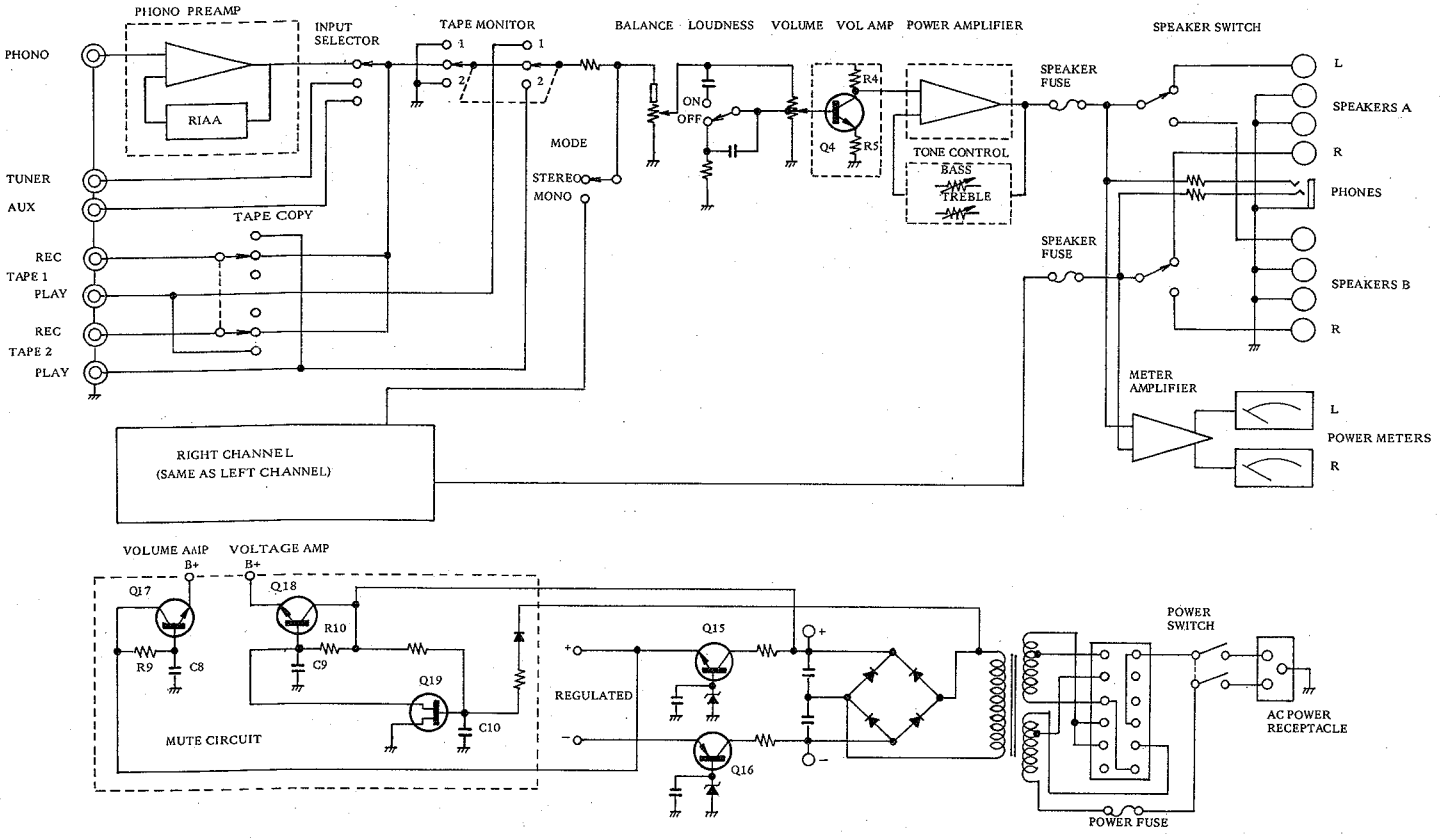
AC Power Requirement
117V AC 60 Hz (USA/Canada version)
100V/117V/220V/240V, switchable
AC 50/60 Hz (European version)

Power Consumption
120 Watts (USA/Canada), 330 Watts (Europe)

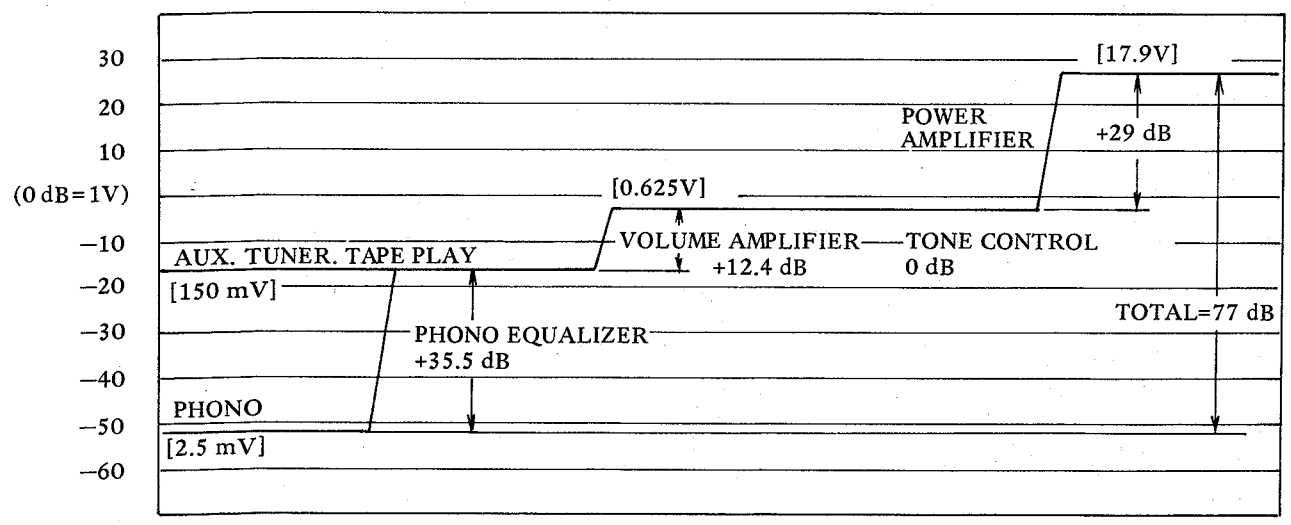
Dimensions
17"W, 5-1/4"H, 11-3/4"D
430W, 132H, 300D (mm)

Net Weight
19 lbs (8.5 kgs)

BLOCK DIAGRAM



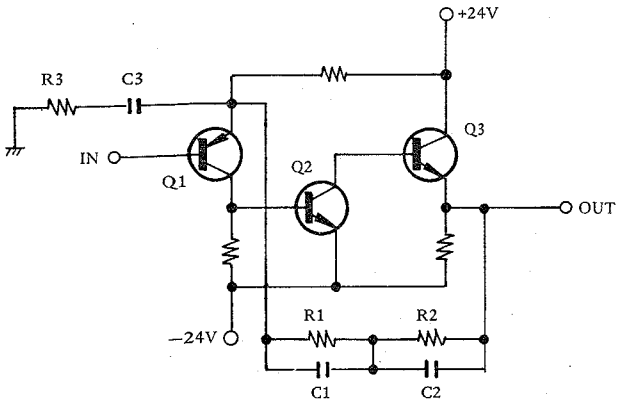
LEVEL DIAGRAM



CIRCUIT DESCRIPTION

Phono Preamplifier

This is a negative feedback type RIAA equalizer. It consists of 3 low noise transistors per channel. Open loop gain of the circuit is 83 dB. Negative feedback consisting of R1, R2, C1 and C2 is applied from the emitter of Q3 to the emitter of Q1 giving gain of 35.5 dB @ 1 kHz and correcting the response to the RIAA equalization standard (+12.9 dB @ 100 Hz, −13.7 dB @ 10 kHz). An additional rolloff below 30 Hz is provided by C3. The circuit is powered by split supply of ±24V, providing an overload capability of greater than 180 mV at 1 kHz.



Volume Amplifier

The signal from the volume control is amplified 12.4 dB by the common emitter amplifier Q4 (refer to block diagram). Gain is set by the ratio of R4 to R5.

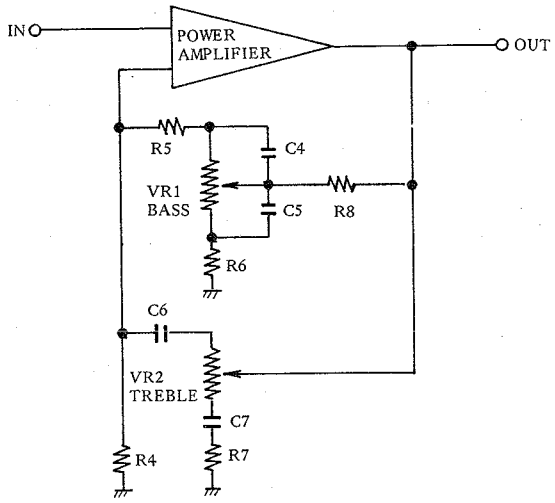
Tone Control

The tone control is a negative feedback type which uses the power amplifier stage as the active element. That is, the gain of the power amplifier stage is controlled by the tone control circuitry.

At 1 kHz, the position of the tone controls has little effect on the gain, as C6 impedance is high, removing VR2 from the circuit, and C4, C5 impedance is low, effectively short circuiting VR1.

BASS CONTROL: As the frequency decreases below 1 kHz, the impedance of C4 and C5 increases proportionately. Thus at very low frequencies, the gain is mainly determined by the position of the bass control VR1. Rotating VR1 toward R6 will boost the low frequencies, while turning it towards R5 will cut the bass.

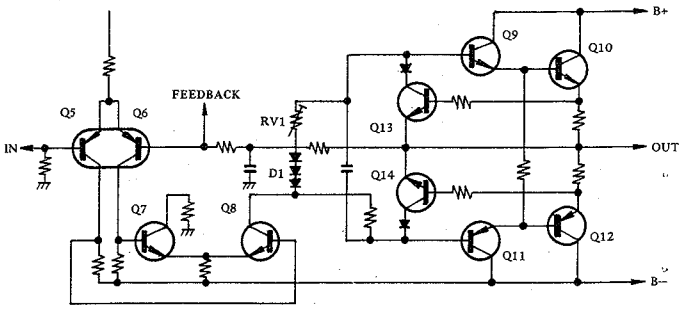
TREBLE CONTROL: At high frequencies, as at 1 kHz, VR1 is effectively short circuited. At these frequencies, however, C6 and C7 impedance decreases, so that VR2 becomes the main control of the amplifier gain. Rotating VR2 towards C7 will boost the treble, while turning it towards C6 cuts the treble response.



Power Amplifier

This circuit is an OCL, fully complementary amplifier. The input stage consists of two differential amplifiers (Q5 to Q8). The first differential amp (Q5 and Q6) is a matched transistor pair in one package providing excellent common mode rejection and low DC offset. Q8 acts as the voltage amplifier providing voltage swing to nearly full plus and minus supply. Current gain is then provided by the fully complementary Darlington pairs of Q9 and Q10 for the positive swing, Q11 and Q12 for the negative swing. The output stage bias is set by the triple diode D1 and RV1. As previously described, amplifier gain is set by tone control circuitry.

The driver and output stage is protected from short circuit and overload by transistors Q13 and Q14, which short out the driving signal when current through the output transistors reaches an excessive level.



Power Supply (Refer to Block Diagram)

The main power supply (±37V) consists of a full wave bridge rectifier and two 8,200 μF capacitors. The B+ and B— regulators (Q15 and Q16) supply ±24V for the low level circuitry. Unwanted transients are eliminated by circuitry consisting of Q17 to Q19 which perform a muting function when the unit it switched ON or OFF. At turn on, the supply voltage for the volume amplifier is delayed by Q17, as determined by the charging time of C8 through R9. In the same way, operation of the voltage amplifier is delayed by Q18, C9 and R10. In this way, the amplifier does not operate until the voltages in the output stage stabilizes.
At turn-off, FET (Q19) immediately turns on, shorting out C9 and eliminating the supply for the voltage amp, stopping amplifier operation.

ADJUSTMENT

Equipment Required

Audio signal generator.
DC voltmeter.
Speaker load resistors, 8 ohm, 100 watt.
Digital voltmeter or DC milliammeter.
The following adjustments are the same for both the left and the right channel.

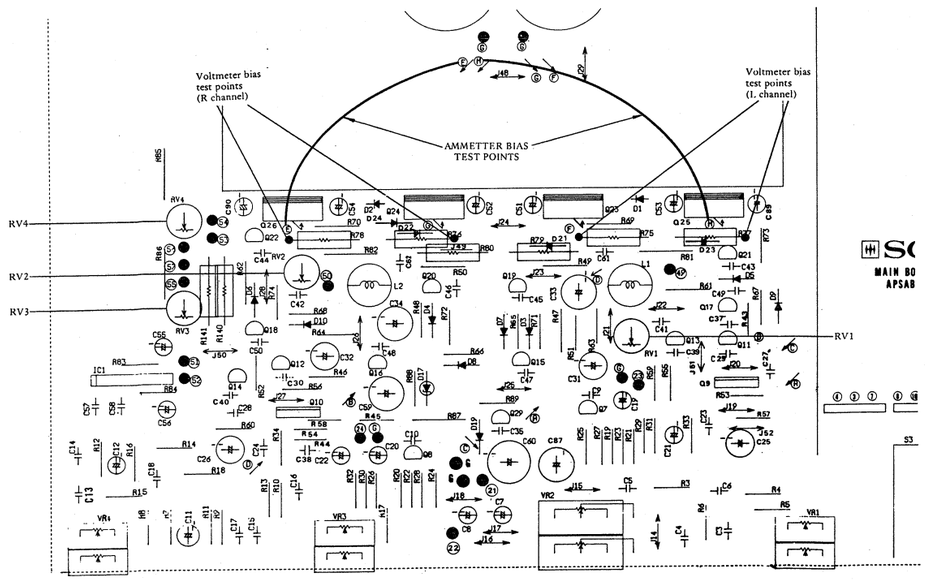
Bias Adjustment

1) Connect 8 ohm resistors to the speaker A terminals, and set the Speaker Mode switch to A position.
2) Turn the Volume control fully counter-clockwise.
3) Turn RV1 fully counterclockwise.
4) Depending on available equipment, use A or B:
   A. Set digital voltmeter to most sensitive voltage range. Connect probes across R75 and R77 (Voltmeter bias test points, L channel).
   Turn unit on. Let it idle for at least one minute. Adjust RV1 for 40 mV across the resistors.
   B. With unit off, remove jumper between PC board terminals H and H, and connect ammeter, set to 100 mA range.
   Turn unit on and let it idle for at least one minute. Adjust RV1 for 40 mA.
5) Perform the same procedure for the right channel, except measure voltage across R76 and R78 (voltmeter bias test points, R channel) or replace jumper from E to E with ammeter. Adjustment is made with RV2.
6) Leave the amplifier on for about 30 minutes, then recheck measurement. A tolerance of ±25% is acceptable. Readjust if necessary.

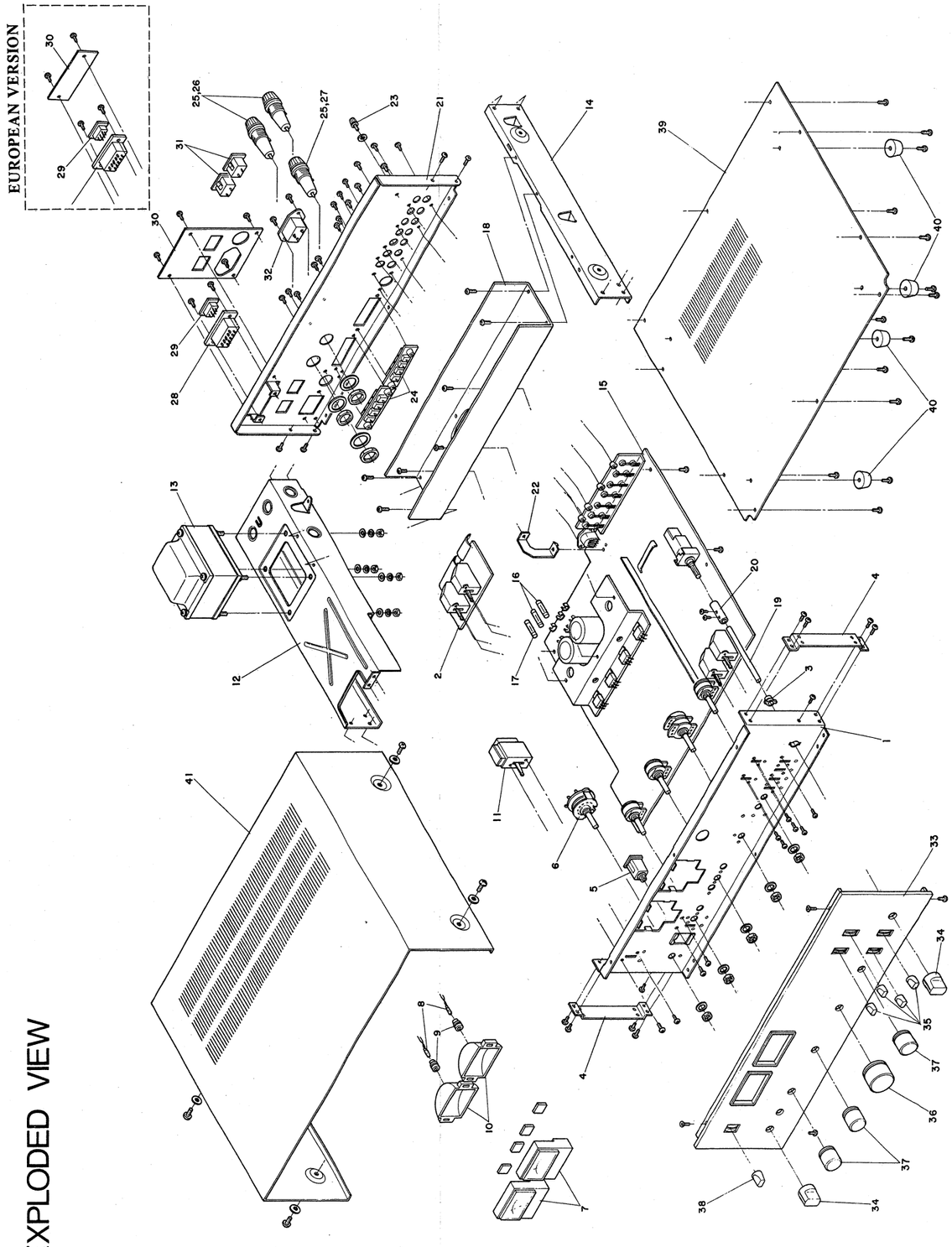
Power Meter Calibration

1) Connect the audio signal generator to the amplifier and apply 1 kHz signal to Aux input, Left channel.
2) Connect voltmeter across the left channel load resistor.
3) Turn power on.
4) Adjust the signal generator output so as to obtain 2.83 volts on the voltmeter.
5) Check that the left channel meter indicates 1 watt. If not, adjust RV3.
6) Perform above steps on the right channel, adjusting RV4 if necessary.

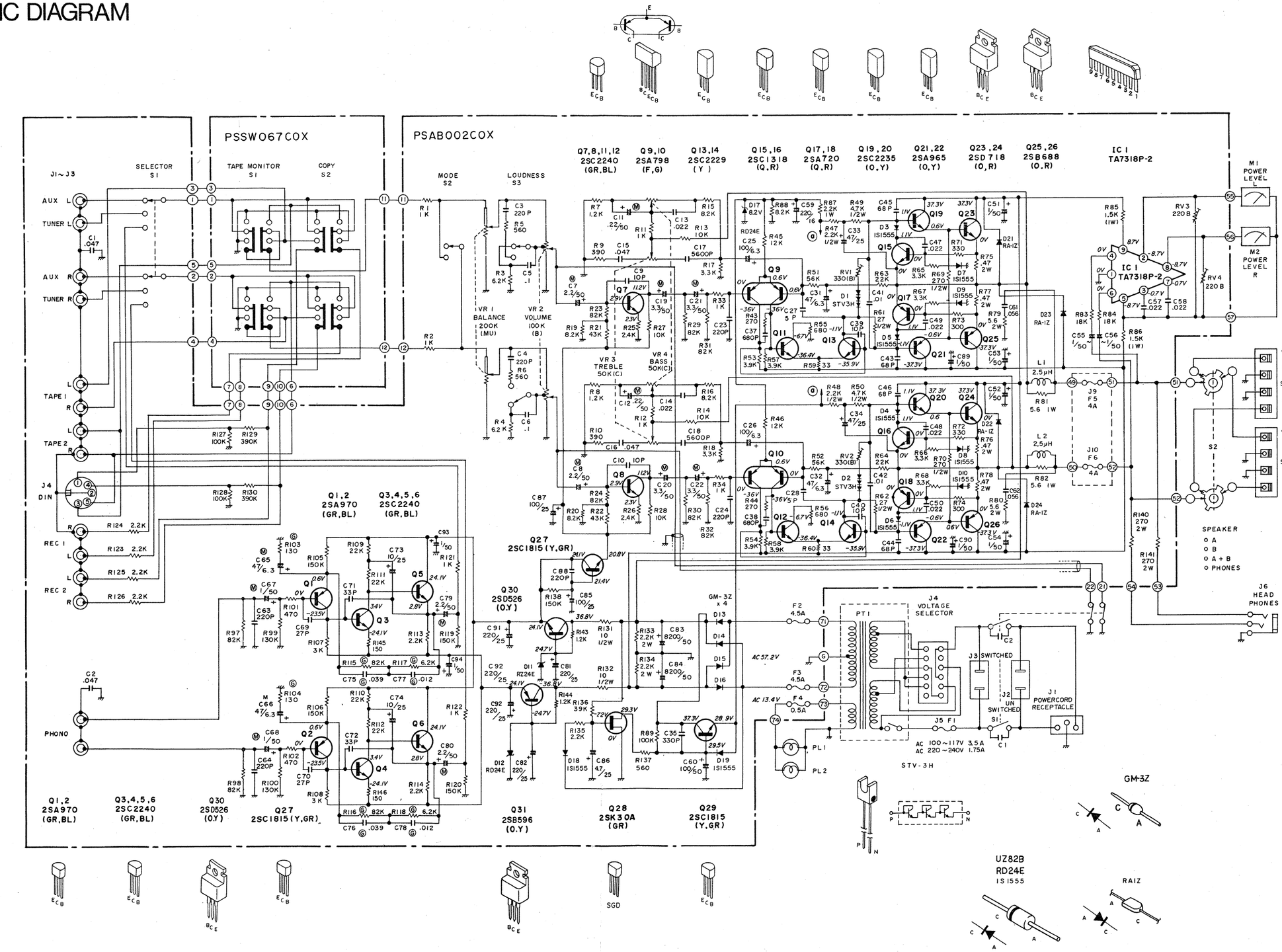
Adjustment Locations



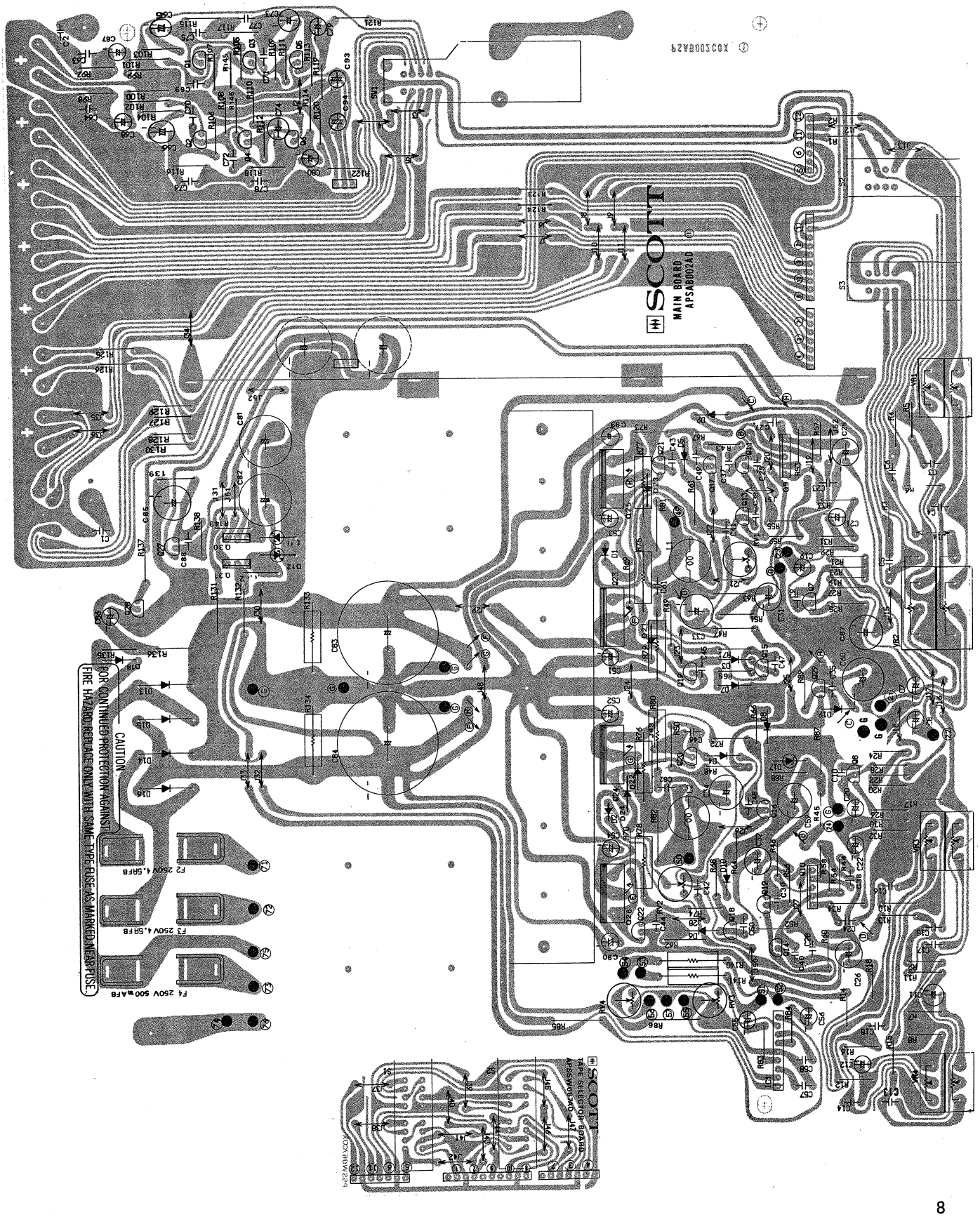
EXPLODED VIEW



SCHEMATIC DIAGRAM



PARTS LOCATION DIAGRAM



REPLACEMENT PART LIST

PC BOARD PS420ACX-01 (No. 15 of Exploded View.)**

Symbol No.	Description	Part Code
IC1	IC, TA7318P-2, Meter	QQM07318AT
L1, 2	Choke coil, 2.5 μH	LA3QH1323B
	Fuse holder [on PC board]	YHF0P0003Z
S1	Rotary SW., Input Sel.	SH020301ZB
S2, 3	Slide SW., Stereo-Mono, Loud.	SL020215ZB
RV1, 2	Semifixed VR., 330(B)	RPJNB33101
RV3, 4	" 220(B)	RPJNB22101
VR1	VR., 200k (MN) x2, Balance	RVQA204X01
VR2	" 100k(B) x2, Volume	RVDA104B01
VR3, 4	" 50k(S) x2, Bass, Treble	RVQA503C03
J1, 2	RCA jacks, 4-p, Tape 1/2	YJP04S016U
J3	" 6-p, Inputs	YJP06S007U
J4	DIN jack, Tape B Rec/Play	YJD05S011Z
Q1, 2	Transistor, 2SA970	QTA0970XAT
Q3—8, 11, 12	" 2SC2240	QTC2240XAT
Q9, 10	Dual-transistor, 2SA798	QTA0798XEE
Q13, 14	Transistor, 2SC2229	QTC2229XBT
Q15, 16	" 2SC1318	QTC1318XDN
Q17, 18	" 2SA720	QTA0720XBN
Q19, 20	" 2SC2235	QTC2235XAT
Q21, 22	" 2SA965	QTA965XAT
Q23, 24	" 2SD718	QTD0718XAT
Q25, 26	" 2SB688	QTB0688XAT
Q27, 29	" 2SC1815	QTC1815XAT
Q28	FET, 2SK30A	QTK0030XBT
Q30	Transistor, 2SD526	QTD0526XAT
Q31	" 2SB596	QTB0596XAT
D1, 2	Bias diode, STV3H	QVESTV3HXD
D3—10, 18, 19	Silicon diode, 1S1555	QDSS1555XT
D11, 12	Zener diode, RD24E	QDZRD24EBA
D13—16	Silicon diode, GM-3Z	QDSGM3ZXXD
D17	" UZ-8.2B	QDZUZ8BXXP
D21—24	" RA-1Z	QDSRA1ZXXD
R47, 48	Metal-Oxide-film resistor, 2.2k, 1/4W	RGHAPJ222N
R49, 50	" 4.7k, 1/2W	RGHAPJ472N
R61, 62	" 27, 1/2W	RGHAPJ270N
R69, 70	" 270, 1/2W	RGHAPJ271N
R79, 80	" 5.6, 2W	RX2ANJ5R6N
R81, 82	" 5.6, 1W	RX1ANJ5R6N
R85, 86	" 1.5k, 1W	RG1ANJ152N
R87	" 2.2k, 1W	RG1ANJ222N
R131, 132	" 10, 1/2W	RXHANJ100N
R133, 134	" 2.2k, 2W	RG2ANJ222N
R140, 141	" 270, 2W	RG2ANJ271N

Symbol No.	Description			Part Code
C1, 2	Ceramic capacitor,	0.047,	50V	CKFB473ZFT
C3, 4	"	220p,	50V	CCFB221KOT
C5, 6	Mylar capacitor,	0.1,	50V	CQMB104KEH
C7, 8	Elyt capacitor,	2.2,	50V	CEAG2R2ZMN
C9, 10	Ceramic capacitor,	10p,	50V	CCGB100DOT
C11, 12	Elyt capacitor,	0.22,	50V	CEAGR22ZMN
C13, 14, 57, 58	Mylar capacitor,	0.022,	50V	CQMB223KTH
C15, 16	"	0.047,	50V	CQMB473KTH
C17, 18	"	5600p,	50V	CQMB562KTH
C19–22	Elyt capacitor,	3.3,	50V	CEAG3R3ZMN
C23, 24, 63, 64, 88	Ceramic capacitor,	220p,	50V	CCFB221KOT
C25, 26	Elyt capacitor,	100,	6.3V	CEWB101ALX
C27, 28	Ceramic capacitor,	5p,	50V	CCGB050COT
C31, 32	Elyt capacitor,	47,	6.3V	CEWB470ALX
CC33, 34	"	47,	25V	CEEE470ALX
C35	Ceramic capacitor,	330p,	50V	CCFB331KOT
C37, 38	"	680p,	50V	CKGB681KBT
C39, 40	"	10p,	50V	CCGB100DOT
C41, 42	Mylar capacitor,	0.01,	50V	CQMB103KTH
C43–46	Ceramic capacitor,	68p,	50V	CCGB680KOT
C47–50	"	0.022,	50V	CKFB223ZFT
C51–54	Elyt capacitor,	1,	50V	CEWB010ALX
C55, 56	"	1,	50V [NP]	CEAG010NLN
C59	Elyt capacitor,	220,	16V	CEED221ALX
C60	"	100,	50V	CEEG101ALX
C61, 62	Mylar capacitor,	0.056,	50V	CQMC563KEH
C65, 66	Elyt capacitor,	47,	6.3V	CEAB470ZMN
C67, 68	"	1,	50V	CEAG010ZMN
C69, 70	Ceramic capacitor,	27p,	50V	CCGB270KOT
C71, 72	"	33p,	50V	CCGB330KOT
C73, 74	Elyt capacitor,	10,	25V	CEWE100ALX
C75, 76	Mylar capacitor,	0.039,	50V	CQMB393GEH
C77, 78	"	0.012,	50V	CQMB123GEH
C79, 80	Elyt capacitor,	2.2,	50V	CEAG2R2ZMN
C81, 82	"	220,	50V	CEEE221ALX
C83, 84	"	8200,	50V	CEQ1G82201
C85, 87	"	100,	25V	CEEE101ALX
C86	"	4.7,	25V	CEWE4R7ALX
C90, 93, 94	"	1,	50V	CEWG010ALX

PC BOARD PSSW067COX (No. 2 of Exploded View.)

S1, 2	Lever SW., 4-p, 3-t, MON, COPY	SL040304ZB

MAIN CHASSIS

Symbol No.	Description	Exp. No.	Part Code
PT1	Power transformer	13	TPA85A001Y
C1, 2	Oil-paper capacitor, 0.01, 450V		CNST103MAN
PL1, 2	Lamp, 14V, 80 mA	8	ZPA148103U
M1, 2	Meter, 250 μA .Power Output	7	ZMD2050K01
J4	Jack, AC volt. Sel., UL listed	28	YJZ10S001U
	Plug, for J4, UL listed	29	YPZ06S004U
S1	Lever SW, Power, SEMKO listed	11	SL020209SA
S2	Rotary SW, Speaker Mode	6	SR0204107T
F1	US/Canada: Fuse, 1.75A, AC primary, UL	27	ZFBQ18201U
	Europe: Fuse, 3.5A, AC primary, UL	27	ZFBQ35201U
F2, 3	Fuse 4.5A, AC secondary, UL	16	ZFBQ45202Z
F5, 6	" 4A, Speaker protect.	26	ZFBQ40201Z
F4	" 0.5A, AC secondary	17	ZFBQ50103Z
J1	AC power receptacle, UL listed	32	YJA03S002U
J2, 3	AC accessory outlet, UL listed	31	YJA020005U
J5	AC fuse holder, UL listed	25	YHF1S3001U
J6	Headphone jack	5	YJS03S016Z
J7, 8	Speaker output terminal	24	YTS045007U
J9, 10	Speaker fuse holder, UL listed	25	YHF1S3001U
J11	Ground terminal	23	YTD01S001U

MECHANICAL COMPONENTS

Description	Exp. No.	Part Code
Front panel	33	AM420A**01
Knob, Input Selector	34	MN376AA019
" Balance, Bass, Treble	37	MN276XA020
" Volume	36	MN386XA024
" Loud, Mode, Tape Mon/Copy	35	VN360SX001
" Power	38	VN370SX001
Chassis, front	1	MB972SL001
" main	12	MC865SL001
" right side	14	MU852SL001
" rear	21	MB972SE035
Cabinet cover	41	MU798SL001
Bottom cover	39	MS986SL001
Feet	40	VM280EB001
Shaft coupler	20	VM460SW002
Shaft, Input selector	19	MT865AD011
Bezel, for power meter		VK165SX002
" for Power SW		VK132SX001
" for Loud and Mode		VK132SX002
" for Tape Mon/Copy		VK132SX003

MISCELLANEOUS

Operating manual Carton Fillers for carton		KT420A**AX KP420A**01 KN420A**03

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